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## LOGICAL ATOMISM AND THE LAW OF PARSIMONY.

I feel—reluctantly—that I can scarcely avoid replying to Mr. Heath's criticisms of my article on "The Law of Parsimony" (*The Monist*, July, 1919). I know that Mr. Heath is well entitled to defend Mr. Russell's views, since he knows a great deal more about the theory of logical atomism than most of us. For that reason I should like to know what answer Mr. Heath would make to my arguments. I do not suppose that these arguments are unanswerable, but, as it seems to me, Mr. Heath has not replied to them at all.

I contrasted two views of the physical world. According to Mr. Russell's view this world consists (1) of my sense-data (actual and remembered), (2) of other people's sense-data (actual and remembered), and (3) of possible sense-data (i. e., of *sensibilia* which are not actually sensed by any one or remembered by any one). Given these entities, the laws of physics can be expressed as logical constructs from them or their constituent parts. According to the other view the world consists of unperceived physical objects which, when they stimulate another unperceived physical object (my body and brain) cause the existence of the sense-data actually perceived.

My principal contention was that the Law of Parsimony cannot decide between these two theories. The second offends the demand for simplicity by assuming unverifiably that unperceived physical objects exist. On the other hand, it does not require us to suppose that there are any sensibles except those actually perceived. Mr. Russell's theory avoids the first luxury but it requires the second. And the hypothesis of the actual existence of *possible* sensibles is just as inimical to the principle of parsimony as the hypothesis of unperceived physical objects, besides having peculiar difficulties of its own.

Mr. Heath's contentions have nothing to do with this argument because he states that the logical atomist merely pares away any kind of entity of which he has no direct awareness. I should be glad to know what logical atomist is ever directly aware of unperceived *sensibilia*.

As I have argued, any explanation of the world must take account of the continued existence of much that is not any one's

perceived sense-datum. Thus if I receive a letter from America I am bound to think that this letter, in some sense, existed continuously from the time it was written to the time it was received. But during that period it was perceived at odd moments only and by a few persons, i. e., by the writer, some postmen and sorters, and myself. If it took three weeks to deliver it was not actually perceived for more than a few minutes. Thus, on Mr. Russell's theory, this particular collection of sensibles was, for some weeks, nothing but a collection of *unperceived* sensibles.

And it is easy to show, I think, that this assumption of the existence of unperceived sensibles, implied by Mr. Russell's theory, is really a very difficult one. If I am at liberty to assume that *any* of the sense-data which I *should* perceive if I looked at the letter, literally exist when I do not perceive them, I am also at liberty to suppose that the sense-data which a rat, or a fly, or an astigmatic octogenarian in the throes of sea-sickness would perceive might also literally exist at any time or place. According to this theory I make no difference to possible sense-data by actually perceiving them. When I open my eyes, standing erect, I merely select some of them. Similarly, I merely select some of them when I am giddy or stand on my head. If the former were there all the time, why not the latter? Any theory which avoids this consequence is surely, *pro tanto*, simpler; and if sensibles exist only when they are sensed, and the differences in them are due to differences in my nervous system when related to other physical objects in an unusual fashion, this consequence is avoided altogether. *Because* the physical objects are the same they *must* cause differences when differently related.

This is the main point, but perhaps I should say something concerning Mr. Heath's other criticisms. I never said that "the sole aim of science cannot be descriptive because models are widely used" (Heath, p. 449), whatever this extraordinary statement can be taken to mean. I said that the sciences are inductive as well as descriptive, that induction is inference, and inference not description. I added that models are illustrative and always contain more than a bare skeleton of logical relationship, so that if the goal of science is the discovery of logical relations, any model must contain an irrelevant addition.

For the rest, Mr. Heath argues that Dr. Schiller's view is at the back of my contentions; and he then attacks Dr. Schiller. I thought I had put my contentions pretty well to the front and I

disclaim this identity. In any case, Dr. Schiller is very well able to defend himself, but I do not see why I should be dragged into this particular *fracas*.

Perhaps I may be permitted to add that the sentence in my article beginning "If, then, all truth is discovery" (p. 343) has a "not" omitted by some one's inadvertence. It should continue "it is hard to suppose that *this* discovery should *not* have preeminent importance," etc.

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In reply to Professor Laird's courteous note I should like to deal with two points only.

1. I did not intend to belittle those grave difficulties in the way of a thoroughgoing logical atomism which Professor Laird has so well expressed. My sole object was to show that the complexities introduced by the enormous number of *sensibilia* are not inconsistent with the use of Occam's razor. For, in limiting—as it does—the *type* of entity assumed, the use of the razor by Mr. Russell may well lead to complexities of description of any perceptual fact. Harris's zoo may have to be consulted, as Professor Laird suggests (p. 334). And yet to condemn logical atomism as inconsistent with the principle of parsimony is to confuse the latter, as I am still inclined to think Professor Laird does, with Mach's "principle of economy." For the economy contemplated by Mach was economy of description, and *that* is attained by an immense multiplication of entities—atoms, electrons, and the like. That is why, as Professor Whitehead puts it, physicists and chemists "have dissolved the simple idea of an extended body, say of a chair, which a child understands, into a bewildering notion of a complex dance of molecules and atoms and electrons and waves of light. They have thereby gained notions with simpler logical relations" (*The Organisation of Thought*, p. 131). On the other hand, the "principle of parsimony" seeks economy in the kind of entity assumed, accepting the resulting complexity of description with unconcern.

2. This leads me to my second point. It is true that Professor Laird does not argue in so many words that the sole aim of science cannot be descriptive because models are so widely used. But he *does* urge that if the sole aim of science is descriptive there is no justification for models. And that is sufficient for the purpose of

my criticism. He says (p. 329), "If the sole aim of science were the discovery by analysis of the logical relations between phenomena, a large number of suggestions in scientific works would have, at best, the value of mere illustrations. For instance, the desire to suggest or construct a model acting according to any given formula would have no scientific justification. When the equations have been discovered, where is the need for a model?" Now models never are used "when the equations have been discovered." Their function is to help forward the discovery of the most general equations. Thus Maxwell's electro-dynamical models served as stepping-stones to a descriptive mathematical system of a more general form than could have been readily developed without their use. As Boltzmann pointed out, in Maxwell's later papers and in his text-book the formulas more and more detach themselves from the models. Hence I contend that, even if science simply seeks general descriptions of the relations holding between phenomena (which is what I meant by speaking of its sole aim as descriptive), there is still a legitimate place for model-building. For that process is not just an incomprehensible little game scientists amuse themselves with, but has its own special function in the development of generalized descriptions.

In conclusion, may I say that I regret having forgotten how unwelcome (and even dangerous) it is to see similarities in the views of rival philosophers. But when Professor Laird, noting that Mr. Russell's use of the razor leads to a theory simpler only in certain respects, concludes that the whole process is rendered "subjective" (p. 332), then there is surely some similarity to Dr. Schiller's claim that it is not "ethically neutral." However, as Professor Laird says, Dr. Schiller can take care of himself.

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